PROFESSIONAL PRACTICE

Middle East Respiratory Syndrome Coronavirus

Louise C. O'Keefe, PhD, CRNP[1]

Abstract: Middle East Respiratory Syndrome Coronavirus (MERS-CoV) is an emerging infectious disease that can present with flu-like symptoms. In individuals with comorbidities or who are immunosuppressed, it can be deadly. The disease is transmitted through contact with someone who has MERS-CoV. The occupational health nurse must be cognizant of and educate the workforce about MERS-CoV transmission, prevention, and treatment.

Keywords: communicable diseases, disease prevention, health education, occupational health and safety programs

The emergence of a potentially fatal viral respiratory illness caused by the Middle East Respiratory Syndrome (MERS-CoV) has renewed attention on global disease threats. The attention on MERS-CoV in the lay media was revived by the case of a 68-year-old man who returned to South Korea after visiting four countries in the Middle East. He was asymptomatic during his flight back to South Korea, but developed symptoms 7 days later. He sought care from two clinics and two hospitals before being diagnosed with MERS-CoV, creating multiple opportunities for exposure among health care workers and other patients. Twenty days after returning to South Korea, one of the confirmed exposures to the index case (the South Korean national) traveled to China against medical advice, and 3 days later, China reported to the World Health Organization (WHO) that the patient had a confirmed case of MERS. These cases are examples of how MERS-CoV has been exported from one region (Middle East) to other countries ("MERS: Here's What You Need to Know," 2015a; WHO, 2015b).

What Is MERS-CoV?

MERS-CoV is a viral respiratory disease caused by a virus first reported in Saudi Arabia in September 2012 (National Center for Immunization and Respiratory Diseases, 2015). Specifically, MERS-CoV is caused by a novel coronavirus, hence MERS-CoV. Coronaviruses are a large family of viruses that can cause diseases ranging from the common cold to severe acute respiratory syndrome (SARS-CoV; WHO, 2014).

Although the first reported cases of MERS-CoV were in Saudi Arabia, retrospective investigations have demonstrated that the first identified MERS-CoV case occurred in Jordan in April 2012 (WHO, 2015a). Countries reporting cases of MERS-CoV include Jordan, Kuwait, Oman, Qatar, Saudi Arabia, the United Arab Emirates, Yemen, Lebanon, and Iran. Countries with travel associated cases include France, Germany, Greece, Italy, the United Kingdom, Malaysia, Philippines, Egypt, the Netherlands, Algeria, Austria, Turkey, South Korea, China, and the United States (Centers for Disease Control and Prevention [CDC], 2015c). The majority of the cases (>85%) have been reported in Saudi Arabia. All recent cases reported outside the Middle East have been exported by individuals who contracted the disease in the Middle East and then traveled outside the country (CDC, 2015c).

Transmission

The route of transmission from animals to humans is not yet clear. Strains of MERS-CoV that match human strains have been isolated from camels in Egypt, Oman, Qatar, and Saudi Arabia (WHO, 2015a). Other animals such as goats, cows, water buffalo, sheep, and birds have been tested but no antibodies have been isolated in these animals. Currently, the consensus is that camels are likely the major reservoir host for MERS-CoV and an animal source of infection in humans (WHO, 2015a).

The virus does not seem to pass easily from person to person unless in close contact, such as providing unprotected care to an infected patient or living with an infected individual (CDC, 2015f; WHO, 2015a). The reported cases appear to be in clusters, such as in health care facilities, where human-to-human transmission is more probable especially where infection control procedures are inadequate. As of June 7, 2015, no community-wide outbreak has been reported (WHO, 2015a).

Clinical Presentation

A wide clinical spectrum of MERS-CoV symptoms has been reported. Disease presentations range from asymptomatic infection to acute respiratory failure, septic shock, and multi-organ failure. A typical presentation of MERS-CoV disease is fever, cough, and shortness of breath. Symptoms may include chills/rigor, sore throat, headache, dizziness, non-productive cough, dyspnea, and myalgias. Some individuals reported

DOI: 10.1177/2165079915607497. From [1]University of Alabama in Huntsville. Address correspondence to: Louise C. O'Keefe, PhD, CRNP, UAH College of Nursing, UAH Faculty and Staff Clinic, University of Alabama in Huntsville, 301 Sparkman Drive, Huntsville, AL 35899, USA; email: louise.okeefe@uah.edu.
For reprints and permissions queries, please visit SAGE's Web site at http://www.sagepub.com/journalsPermissions.nav.
Copyright © 2015 The Author(s)

gastrointestinal symptoms such as diarrhea, nausea, vomiting, and abdominal pain. Complications such as pneumonia and kidney failure were seen in individuals with pre-existing conditions such as diabetes, cancer, weakened immune system, and chronic lung, heart, and kidney disease. The virus appears to cause more severe disease in older individuals and those with the comorbidities described above. About 3 to 4 of every 10 individuals with MERS have died (CDC, 2015d). The median incubation period for secondary cases associated with human-to-human transmission is approximately 5 days with the range being from 2 to 14 days (CDC, 2015d).

Chest radiographic findings may include bilateral patchy densities, interstitial infiltrates, consolidation, and pleural effusions. Laboratory findings may include leukopenia, lymphopenia, thrombocytopenia, and elevated lactate dehydrogenase levels. Nosocomial bacterial and fungal infections have been reported in mechanically ventilated patients. MERS-CoV virus can be detected with a higher viral load and with longer duration in the lower versus upper respiratory tract. The virus has also been detected in feces, serum, and urine. Most state laboratories are approved to test for MERS-CoV using the CDC's real-time reverse transcription polymerase chain reaction (rRT-PCR) assay. At this time, very limited data are available on the duration and extrapulmonary MERS-CoV shedding (CDC, 2015d).

Identification of Individuals With MERS

The CDC (2015a) recommends that individuals should be evaluated for MERS-CoV if they present with the following:

- a fever **AND** pneumonia or acute respiratory distress syndrome **AND**
  - a history of travel from countries in or near the Arabian Peninsula within 14 days before onset of symptoms **OR**
- close contact with a symptomatic traveler who developed fever and acute respiratory illness within 14 days after traveling from countries in or near the Arabian peninsula **OR**
- an individual who is part of a cluster of individuals with severe acute respiratory illness of unknown etiology in which MERS-CoV is being evaluated in consultation with state and local health departments **OR**
- fever and symptoms of respiratory illness
  - **AND** being in a health care facility within 14 days before symptoms onset in a country near the Arabian Peninsula in which recent health care-associated cases of MERS have been identified **OR**
- fever **OR** symptoms of respiratory illness **AND**
  - close contact with a confirmed MERS case.

Prevention and Treatment of MERS-CoV

Currently, no vaccine is available to prevent MERS-CoV infection. According to the CDC (2015e), prevention includes actions that should be taken for any respiratory illness. These actions include washing hands with soap and water for 20 seconds or using an alcohol-based hand sanitizer if no water is available; covering mouth and nose with a tissue when coughing or sneezing; avoiding touching eyes, nose, and mouth with unwashed hands; avoiding personal contact such as kissing or sharing cups or eating utensils; and cleaning and disinfecting frequently touched surfaces such as doorknobs.

As a general precaution, anyone visiting farms or other places where camels or other animals are present should wash their hands and use other appropriate hygiene procedures. Contact with sick animals should be avoided. Undercooked meat should not be eaten. Camel meat and camel milk can continue to be consumed after pasteurization, cooking, or other heat treatments that kill microbes. Individuals with diabetes, renal failure, or chronic lung disease or who are immunocompromised are considered at high risk for severe disease after MERS-CoV exposure and should take appropriate precautions to avoid contact with camels, eating undercooked camel meat, or being in contact with individuals exposed to MERS-CoV (WHO, 2015a).

No specific antiviral treatment for MERS-CoV infection has been developed. Clinical management includes supportive treatment of complications based on the individual's clinical presentation (WHO, 2015a).

Role of Occupational Health Nurse

The primary responsibility of occupational health nurses during any emerging health issue is to stay informed on the latest information available. Guidelines for individual work practices are available from the CDC's MERS-CoV guidance website (http://www.cdc.gov/coronavirus/mers/interim-guidance.html) and the WHO website (http://www.who.int/csr/disease/coronavirus_infections/en/). Employees require education on the risk of transmission within the workforce. Clearly outlined procedures are needed to guide supervisors on when to refer workers to the occupational health nurse and ensure that sick leave policies are enforced so that ill workers stay home and later safely return to work. MERS-CoV has highlighted how global travel interconnects the world. Currently, the CDC (2015b) does not recommend that anyone change travel plans due to MERS-CoV because most instances of transmission have occurred during close contact (e.g., health care workers and those individuals living with or caring for a family member). Recommendations from the CDC (2015b) for travel to Saudi Arabia include updating vaccines and general hygienic procedures. If workers do travel, they should monitor themselves for acute illness and know where to seek treatment. The occupational health nurse also should update the worksite's emergency preparedness and response plan, and consult appropriate resources such as the CDC and WHO for up-to-date recommendations. The occupational health nurse should stay in touch with local and state health departments regarding the reporting of MERS-CoV cases. The occupational health nurse and other health care providers in the workplace should be

medically cleared, fit-tested, and trained for respirator use. Personal protective equipment and other infection control supplies (e.g., hand sanitizers and facemasks) should be available for both health care providers and workers. Through continuous monitoring of information about MERS-CoV, its transmission, symptoms, prevention and treatment, and worker education, the occupational health nurse can decrease anxieties at the workplace.

Conclusion

MERS-CoV warrants continued attention, especially in light of the increased prevalence of international travel. Even though a pandemic is less likely with MERS-CoV infection due to its close person-to-person transmission, a high level of vigilance in those countries with a significant number of travelers to the Middle East (e.g., migrant workers residing in the Saudi Arabian peninsula) is warranted (CDC, 2015f). The occupational health nurse has a responsibility to educate workers about the transmission, prevention, and treatment of this infectious disease. By monitoring MERS-CoV outbreaks, occupational health nurses can fulfill their responsibility for creating and maintaining healthy and safe workplaces.

Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

Centers for Disease Control and Prevention. (2015a). *Case definitions*. Retrieved from http://www.cdc.gov/coronavirus/mers/case-def.html

Centers for Disease Control and Prevention. (2015b). *Guidance for travel*. Retrieved from http://www.cdc.gov/coronavirus/mers/travel.html

Centers for Disease Control and Prevention. (2015c). *Middle East respiratory syndrome (MERS)*. Retrieved from http://www.cdc.gov/features/novelcoronavirus/

Centers for Disease Control and Prevention. (2015d). *MERS clinical features*. Retrieved from http://www.cdc.gov/features/novelcoronavirus/

Centers for Disease Control and Prevention. (2015e). *Prevention & treatment*. Retrieved from http://www.cdc.gov/coronavirus/mers/about/prevention.html

Centers for Disease Control and Prevention. (2015f). *Transmission*. Retrieved from http://www.cdc.gov/coronavirus/mers/about/transmission.html

MERS: Here's what you need to know. (2015). *Newsweek*. Retrieved from www.newsweek.com/mers-heres-what-you-need-know-338196

National Center for Immunization and Respiratory Diseases. (2015). *Middle East respiratory syndrome*. Retrieved from http://www.cdc.gov/ncird/dvd.html

World Health Organization. (2014). *Global alert and response. Frequently asked questions on Middle East respiratory syndrome coronavirus (MERS-CoV)*. Retrieved from http://who.int/csr/disease/coronavirus_infections/faq/en/.

World Health Organization. (2015a). *Middle East respiratory syndrome coronavirus (MERS-CoV)*. Retrieved from http://www.who.int/mediacentre/factsheets/mers-cov/en/

World Health Organization. (2015b). *Middle East respiratory syndrome coronavirus (MERS-CoV) in the Republic of Korea*. Retrieved from http://www.who.int/mediacentre/news/situation-assessments/2-june-2015-south-korea/en/

Author Biography

Louise C. O'Keefe, PhD, CRNP is the Director of the UAH Faculty & Staff Clinic, which is an on-site employee health clinic on the campus of The University of Alabama in Huntsville. Dr. O'Keefe is an Assistant Professor at the College of Nursing and is currently teaching in the DNP program.